

der Waben leben und in dem Gemülle unterhalb des Nestes nicht vorkommen.

Auf jeden Fall möchte ich aber abraten, mit geringeren Vorsichtsmassregeln, als ich es getan habe, an die Sache heranzugehen. Tötungs- oder Betäubungsmittel wollte ich absichtlich vermeiden, um auch vielleicht vorhandene Trichopterygiden bequem zu erhalten, von den Tieren war aber nichts vorhanden.

Hosts of Insect Eggparasites in Europe, Asia, Africa and Australasia, with a Supplementary American List.

By A. A. Girault, Nelson N. Q., Austral.

(Schluss aus Heft 5.)

Of great interest is the fact, plainly seen from the combined lists, of the great unanimity of habit in those genera of parasites widely distributed over the earth. *Trichogramma* in Australia, Europe, North America, the West Indies, Hawaii and Asia shows its unanimous preference for the eggs of the Lepidoptera; the family to which it belongs is everywhere parasitic upon insect eggs; native species of the genus *Oligosita* of the same family seem everywhere to parasitize jassid eggs in the stems of various grasses. *Podagrion* is parasitic upon Mantid eggs in Australia, the Americas, Africa, Europe and Asia, throughout all of the great zoogeographical realms so that if one should alight on an hitherto unknown and remote island and find one of these beautiful little creatures one could predict with scientific certainty that search would reveal before long one of the usual eggcases of a Mantid. Under the same circumstances, if a *Seclio* were found, one could as surely predict that Acridiids were present. It is rather remarkable, when we think of it, that a great genus like *Telenomus* has similar habits in Europe, Africa and Australia. Why are not the Australian species parasitic upon larvae or even phytophagous. Is it not because of relationship and heredity? The striking unanimity points too strongly in that direction; it is too great to have been what we may term accidental.

On the other hand another thing that impresses us is that similarity of habit has no necessary significance as indicating blood relationships; an adaptive habit or an adaptive organ is to be looked upon as being of least importance in determining relationship.

Another point brought out by the combined lists is the wide distribution of certain of the species which are parasitic upon commercial insects. *Trichogramma minutum* Riley is a striking example. Why is this minute and fragile atom world-wide in its distribution. The most reasonable answer is that it has been distributed by commerce in agricultural plants with one of its many hosts. *Anagrus armatus* (Ashmead) is another minute and delicate insect widely distributed over the Nearctic and Australian realms and this is also parasitic upon insects associated with commercial crops throughout those realms.

It is impossible to have worked upon eggparasitism and not to have been struck with the great omnivorousness of some of the species, denoting great adaptability and eminent success in life. Some of the smallest of insects seem to be the most successful, witness the ants and judging by numbers certain of the Mymaridae, such as *Anagrus*,

Gonatocerus and *Polynema* and of the *Trichogrammatidae* such as *Oligosita* and *Trichogramma*. Indeed, the latter family strikes me as being a rising one and eggparasitism strikes me as being on the increase, seemingly opening up a new, attractive and unfailing source of food for those insects which are variable enough and adaptive enough to avail themselves of it.

A single species of parasite may have a great many different hosts scattered over several orders, either in the same locality or over many different localities (e. g. *Trichogramma minutum* Riley). On the contrary, a single host species may have several or more parasites of different groups in the same locality. As many as three distinct genera of *Trichogrammatidae* have been reared from the eggs of *Horiola arquata* at the same time and in the same place; from *Anasa tristis* an encyrtid, three congeneric species of a scelionid and a eupelmid have been reared at different times. The majority of hosts are Lepidopterous and this is more or less significant because the eggs of this order of insects are usually deposited in masses and nearly always in exposed situations; therefore they are readily seized upon. It must not be supposed, however, that the use of eggs as hosts is limited by this condition, since the Hemiptera and Orthoptera are also commonly and abundantly used as hosts and a large number of these place their eggs in hidden places, quite often into the woody twigs and stems of trees and shrubs or gathered into specially hardened cases.

Literature Referred to.

1833. Haliday, A. H. Ent. Mag., London, I, p. 348.
 1834. Nees ab Esenbeck. Hymenop. Ichneumonibus affinium Monogr., II.
 1836. Walker, Francis. Ent. Mag., London, III, p. 353.
 1839. Westwood, John Obadiah. Introduction Modern Classification Insects, I (cf. p. 422).
 1840. Westwood, John Obadiah. Ib., II.
 1841. Foerster, Arnold. Beiträge zur Monographie der Pteromalinen Nees, Aachen, Heft I.
 1844. Westwood, John Obadiah. Trans. Ent. Soc. London, IV (1845—1847).
 1851. Foerster, Arnold. Verhandl. d. Naturhist. Verein. d. preuss. Rheinl.
 1871. Giraud. Annales Soc. Ent. France. (See Zool. Record, 1871.)
 1871. Id., ibid., series 5, I, Bull., p. XVIII.
 1871. Newman, Edward. The Ent., London, V.
 1874. Dours. Cat. Synonym. Hymenop. de France, Amiens.
 1876. Mayr, Gustav. Die europäischen Encyrtiden. Biologisch und systematisch bearbeitet.
 1877. Giraud, Joseph: Étienne and Alexandre Laboulbène. Annales Soc. Ent. France, 5^e série, VII.
 1877. Rondani, Camillo. Respertorio degli insetti parassiti e delle loro vittime. Supplemento alla parte Prima. Estratto dal Bull. Soc. Ent. Italiana, Anno IX.
 1880. Lichtenstein. Le Naturaliste, II.
 1880. Packard, A. S. Guide to the Study of Insects, New York, edition 7.
 1887. Riley, Charles Valentine. Report Ent., in Rep. U. S. Commissioner of Agric. f. 1886, Washington.
 1888. Howard, Leland Ossian. Proceedings Ent. Soc. Washington, I, p. 133.
 1891. Howard, Leland Ossian. Proceedings U. S. Nat. Museum, XIV.
 1892. Riley, Charles Valentine and Leland O. Howard. Insect Life, U. S. Dept. Agric., Washington, IV.
 1893. Ashmead, Wm. Harris. Bull. Nr. 45, U. S. Nat. Museum, Washington.
 1894. Idem. Trans. Amer. Ent. Soc., Philadelphia, XXI.
 1895. Idem. Bull. Illinois St. Laby. Nat. Hist., Urbana, IV.
 1897. Enock, Fred. Proc. Ent. Soc. London.

1898. Dalla Torre, Karl G. Catalogus Hymenopterorum, Lipsiae, V.
 1898. Zehntner, L. Bull. Nr. 10, new series, Div. Ent. U. S. Dept. Agric., Washington.
 1900. Enock, Fred. Proc. Ent. Soc. London f. 1899.
 1901. Idem., ib., 1900.
 1902. Marlatt, Charles Lester. Circular Nr. 51, second series, Div. Ent., U. S. Dep. Agric., Washington.
 1903. Marlatt, Charles Lester. Bull. Nr. 40, new series, Div. Ent., U. S. Dep. Agric., Washington.
 1904. Ashmead, William Harris. Journal New York Ent. Society, XII.
 1904. Kryger, J. P. Entomologiske Meddelelser, Kjobenhavn, series 2, Vol. II.
 1905. Kieffer, J. J. Annales Soc. Sci. Bruxelles, XXX (2).
 1905. Perkins, R. C. L. Bull. Nr. 1, Div. Ent., Hawaiian Sugar Planters' Association, Honolulu.
 1906. Froggatt, Walter W. Agric. Gazette New South Wales, Sydney, XVII.
 1906. Ibid., separate.
 1906. Kotinsky, Jacob. Report Div. Ent. Ty. Hawaii f. yr. 1905, Honolulu.
 1906. Mair, J. Bull. Nr. 2, Div. Ent., Hawaiian Sugar Planters' Association, Honolulu.
 1907. Girault, A. A. Psyche, Boston (U. S. A.).
 1907. Kirkaldy, G. W. Bull. Nr. 4, Div. Ent., Hawaiian Sugar Planters' Association, Honolulu.
 1907. Schreiner, J. J. Zeitschr. f. wissenschaftliche Insektenbiologie, Husum, Band III.
 1907. Swezey, Otto H. Rep. Exp. Sta., Hawaiian Sugar Planters' Assoc., Bull. Nr. 5, Div. Ent.
 1908. Brues, C. J. Bull. Wisconsin (U. S. America) Natural Hist Society, VI.
 1908. Enock, Frederick. Ent. Monthly Mag., London, XXXIV, second series IX.
 1908. Masi, Luigi. Boll. del laboratorio di zoologia generale e agraria della R. Scuola Superiore d'Agricoltura in Portici, III.
 1908. Silvestri, F. Ibid.
 1910. Brocher, Frank. Annales de Biologie Lacustre, Bruxelles, IV.
 1910. Crawford, J. C. Canadian Ent.
 1910. Howard, L. O. Bull. Nr. 19, technical series, Bureau Ent., U. S. Department of Agriculture, Washington.
 1910. Kieffer, J. J. Genera Insectorum dirigés par P. Wytsman, Bruxelles, Fascicule 80 B.
 1910. Perkins, R. C. L. Fauna Hawaiiensis, II.
 1911. Cameron, Peter. Proc. Linnean Society New South Wales, XXXVI.
 1911. Crawford, J. C. Proc. United States National Museum, Vol. 40.
 1911. Crawford, J. C. Proc. United States National Museum, Vol. 41.
 1911a. Girault, A. A. Psyche, Boston (U. S. A.).
 1911b. Girault, A. A. Transactions American Ent. Society, XXXVII.
 1911c. Girault, A. A. Ibid., XXXVII.
 1911d. Girault, A. A. Archiv f. Naturgesch., Berlin.
 1911e. Girault, A. A. Bull. Wisc. Nat. Hist. Society, IX.
 1912. Crawford, J. C. Proc. United States National Museum, Vol. 42.
 1912. Crawford, J. C. Proc. United States National Museum, Vol. 43.
 1912. Girault, A. A. Ent. News, Philadelphia, XXIII.
 1912. Perkins, R. C. L. Bull. Nr. 10, Division of Ent., Hawaiian Sugar Planters' Association, Honolulu.
 1912. Webster, F. M. Bull. Nr. 112, Bur. Ent., U. S. Dept. Agric., Washington, p. 35, fig. 15.
 1913. Crawford. Proc. Un. St. Nation. Museum, Vol. 45.
 1913. Girault, A. A. Ent. News, Philadelphia, XXIV.
 1913. Girault, A. A. Proc. Ent. Society Washington, XV.

Corrections to Part II of the American List (Girault 1911a).

- Page 146, last line, insert with one exception after the word itself.
 Page 148, line 18, Dr. Geer read De Geer; the host on this line is most probably wrong, the parasite coming from jassid eggs.
 Page 150, line 25, *Anatus* read *Anastatus*.
 Page 150, line 17, Ashmead, 1900 should read Ashmead, 1900a.
 Page 150, footnotes, line 11, omit the small a before the word This.